Adding mixed measures

Mixed measures are measurements like hours, minutes and seconds, or yards, feet, and inches. It's fairly simple to understand the distance

3 yards, 2 feet, 4 inches

If we want to add two sets of mixed measures, the method we use is essentially the same thing we do when we add mixed numbers. First, we add the individual measures, like hours or minutes, or yards or feet, separately. That's the easy part. The trickier part is the second part, which is simplifying the result of the first part.

As a reminder, here are some conversion formulas to use in these kinds of problems:

1 yard = 3 feet = 36 inches

1 hour = 60 minutes = $3{,}600$ seconds

Let's do an example.

Example

Find the sum of the mixed measures.

3 yards, 2 feet, 4 inches

6 yards, 2 feet, 8 inches

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First, we'll add the yards, the feet, and the inches separately.

$(3 + 6)$ yards, $(2 + 2)$ feet, $(4 + 8)$ inches

9 yards, 4 feet, 12 inches

We've now converted the sum of the two original sets of mixed measures to a single set of mixed measures. Since 12 inches is equivalent to 1 foot, we want to simplify that result so that the number of inches is less than 12. We do this by working from right to left. We'll first rewrite 12 inches as 1 foot, and then we'll add that 1 foot to the 4 feet we've already found:

9 yards, 4 feet, 12 inches

9 yards, 4 feet, 1 foot

9 yards, $(4 + 1)$ feet

9 yards, 5 feet

Since there are 3 feet in a yard, we want to simplify that result so that the number of feet is less than 3. We'll first express 5 feet as the sum of 3 feet and 2 feet, then rewrite 3 feet as 1 yard, and add that 1 yard to the 9 yards we've already found:

9 yards, 3 feet $+ 2$ feet

9 yards, 1 yard $+ 2$ feet

$(9 + 1)$ yards, 2 feet

10 yards, 2 feet

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This is the sum of 3 yards, 2 feet, 4 inches and 6 yards, 2 feet, 8 inches.

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